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The Determinants of the Distribution of Mortality in Mountain States Counties

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THE DETERMINANTS OF THE DISTRIBUTION OF MORTALITY IN MOUNTAIN STATES COUNTIES

by

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I. INTRODUCTION

There has been significant concern about economic equity, expressed in legislation at federal, state, and local levels affecting income distribution and access to public services. Such a large interest in equity must also extend, then, to the ultimate inequality: distribution of life spans. The purpose of this paper is to determine the significant factors that affect the distribution of mortality by county in the Mountain States. Mortality distribution is the span of differences of age at death. This is an interesting topic because mortality affects everyone. Hence, individuals who care about living longer would be interested in knowing the factors that lead to discrepancies in the distribution of mortality. In addition, local and state government officials, public health officials, health economists, and other public-policy makers interested in the factors affecting mortality and the distribution of mortality will benefit from the results of this study. Information regarding the factors affecting the distribution of mortality will allow society to direct the resources allocated to equity in a more economically efficient way.

Section II will discuss previous literature done in the area of mortality, and will also include a look at a few pertinent life expectancy studies. Section III will provide a description of the data used in this analysis, how the data was collected, and the expected results of this research. Section IV will detail the different methods and models used to analyze the data, and why each was used in this study. Section V will give the regression results and discuss the findings. Section VI will give conclusions that can be drawn from these findings. Section VII will discuss opportunities for further research in this area.

II. LITERATURE REVIEW

Although there have been several studies examining the determinants of life expectancy and mortality, this research has focused on small samples and/or very few explanatory variables. Conspicuously missing from the body of literature on this topic are any large-scale studies investigating the factors affecting the distribution of mortality. In fact, there has been only one publication examining the distribution of mortality. Israelsen, Israelsen and Israelsen (2005a) conducted a study on the distribution of mortality in U.S. counties. Their research was preliminary and did not look at the determinants of mortality distribution, only at the relative inequality of the distribution itself. They observed several interesting results, including rankings of mortality distribution by US county and that the distribution of mortality is 30% less equal for men than for women. Because a few of the listed counties are included in the scope of this paper, these rankings have been included (Table 1). Other research on mortality includes Franzini, Ribble, and Spears (2001) who analyzed income factors on mortality in Texas counties, controlling for ethnicity, education, and access to health care. They found that in counties with a population over 150,000, mortality was greater with income inequality, and in counties containing fewer than 150,000 the opposite was true. Hurt, Ronsmans, and Thomas (2006) looked at the effects of birth rates on women's mortality and concluded that there is a negative relationship between births and mortality. Other studies have looked at mortality in different contexts, including the effect of the splitting of the Soviet Union on mortality rates in Russia (Brainerd and Cutler, 2005) and mortality as a factor in population changes (Guillot, 2005). This will be the first study done on the distribution of mortality by county.

Also of interest are studies done on life expectancy. Two articles that come close to the topic discussed in this paper are by Israelsen, Israelsen and Israelsen. In 2001, they studied the

Table 1. U.S. counties with the highest and lowest Gini coefficients.

Counties with the lowest Gini coefficients

Males		Females	
County	**Gini**	**County**	**Gini**
McPherson, NE	0.0205	Thomas, NE	0.0368
Roberts, TX	0.0463	Camas, ID	0.0370
Kenedy, TX	0.0484	Jones, SD	0.0386
Slope, ND	0.0500	Loup, NE	0.0419
Wheeler, OR	0.0526	Roberts, TX	0.0454
Sully, SD	0.0538	Logan, NE	0.0475
Rock, NE	0.0636	Wallace, KS	0.0513
Grant, NE	0.0643	Billings, ND	0.0546
Oliver, ND	0.0666	McMullen, TX	0.0553
Puite, UT	0.0668	Oldham, TX	0.0555
Logan, NE	0.0705	Greeley, KS	0.0560
Billings, ND	0.0717	Logan, ND	0.0561
Mineral, CO	0.0732	Rich, UT	0.0568
Prairie, MT	0.0734	Sheridan, KS	0.0571
Kent, TX	0.0750	Wibaux, MT	0.0582
Hayes, NE	0.0760	Cheyenne, CO	0.0583
Logan, ND	0.0762	Kent, TX	0.0583
Keya Paha, NE	0.0773	Harding, SD	0.0598

Counties with the highest Gini coefficients

Males		Females	
County	**Gini**	**County**	**Gini**
Wade Hampton, AK	0.2978	Wade Hampton, AK	0.2956
Dillingham, AK	0.2891	North Slope, AK	0.2496
Nome, AK	0.2888	Apache, AZ	0.2325
Bethel, AK	0.2847	Pitkin, CO	0.2309
Chattahoochee, GA	0.2816	Bethel, AK	0.2256
North Slope, AK	0.2786	Shannon, SD	0.2233
Yukon-Koyukuk, AK	0.2694	Corson, SD	0.2222
Apache, AZ	0.2692	Todd, SD	0.2198
Prince of Wales-Outer Ketchikan, AK	0.2582	Dillingham, AK	0.2194
Pitkin, CO	0.2582	Kenai Peninsula, AK	0.2162
McKinley, NM	0.254	Nome, AK	0.2152
Summit, CO	0.2498	Eagle, CO	0.2115
Garfield, MT	0.2447	Fairbanks North Star, AK	0.2103
Sioux, ND	0.2428	Clear Creek, CO	0.2085
Todd, SD	0.2426	Alpine, CA	0.2063
Kodiak Island, AK	0.2412	Yukon-Koyukuk, AK	0.2057
Eagle, CO	0.2374	Briscoe, TX	0.2044
Shannon, SD	0.2335	McKinley, NM	0.2032
Coconino, AZ	0.2325	Sioux, ND	0.2028
San Juan, UT	0.2291	Matanuska-Susitna, AK	0.1952

Source: Israelsen, Israelsen, Israelsen (2005a)

determinants of life expectancy by county for all the counties in the U.S. They did a follow up study in 2002 to look specifically at the Mountain States counties. The second study is of most value in the composition of this study. Several significant factors affecting life expectancy were identified. These include educational attainment, percent of the population speaking a language other than English at home, percent of the population foreign-born, income, and income squared. These factors all had a positive effect on life expectancy, as did the percent of the population whose ancestry is Northern European. The percent of the population that is black and the percent that is American Indian, Eskimo, and Aleut are negatively related with life expectancy. Other variables that have a negative effect on life expectancy are violent crime rates, population density, latitude, and elevation. It is important to note that many of these factors affect only one of the sexes, or affect them in varying significance. This is not a full list of the significant factors, and the implications of this study will not be discussed further, as it is pertaining to life expectancy and not mortality.

Another pertinent study done by Israelsen, Israelsen, and Israelsen (2005b) looked specifically at the distribution of life expectancy at the state level. They found that the distributions of poverty rate, urbanization, education, percent white, and age within states were important determinants of the distribution of life expectancy. Numerous articles have been published on life expectancy, but, as with mortality, they generally studied small populations or looked at relatively few factors of life expectancy, such as race (Ewbank, D.C. (1987), Geronimus et al (1996), Harvard (1998), Manton et al (1987), McGehee (1994)), and few have been comparative analysis studies.

III. DATA

This paper will use mortality data from the Multiple Cause of Death File of the National Center for Health Statistics from 1985 to 1994. Because of privacy concerns, the National Center for Health Statistics stopped making individual death data for "small" counties available after 1988. Due to this restriction on information, data for the year 1988 was the most recently available data to conduct this study. The data for the Mountain States will be used. These states are Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. State effects will be identified through the use of dummy variables.

Two separate dependent variables are used in a regression model. These two variables are the Gini coefficients by county for both men and women. The Gini coefficient is a measure of the relative inequality of the distribution of mortality.

A description of each independent variable is listed in Table 2. Data for population, urban population, rural farm population, households, poverty, educational attainment, language, foreign born, ancestry, and race are taken from the U.S. Bureau of Census. Income data are taken from the U.S. Bureau of Economics Analysis. Unemployment data are taken from the U.S. Bureau of Labor Statistics. Crime data are taken from the U.S. Federal Bureau of Investigation. Latitude and elevation data are taken from the U.S. Geological Survey. Insolation rates are taken from NASA.

These independent variables were chosen based on a survey of the literature done in related areas, specifically work done by Israelsen, Israelsen, and Israelsen. Because life expectancy and mortality are closely related, the significant determinants discovered by these studies were used in the modeling of this paper. Expectations for the impacts of certain variables

Table 2. Variable names and descriptions

Variable Name	Variable Description
AZ	county in Arizona (d)
ID	county in Idaho (d)
MT	county in Montana (d)
NV	county in Nevada (d)
NM	county in New Mexico (d)
UT	county in Utah (d)
WY	county in Wyoming (d)
MARRIED	percent of the county households in which a married couple resides
HHSIZE	mean household size
MORTGAGE	average household monthly mortgage payment
REAL_PCINC	per capita income *(average monthly U.S. rent/average rent in county)
POVERTY	percent of the county population below the poverty level
URBAN	percent of the county population living in an urban area
RURAL_FARM	percent of the county population living on a rural farm
FOREIGN_BORN	percent of the county population born in a foreign country
LANGUAGE	percent of persons 5 years and older speaking a language other than English at home
UNEMPLOYMENT	civilian labor force unemployment rate
CRIME_INDEX	crime rate index
VIOLCRIME	violent crimes per 100 people
EDUC	percent of persons 25 years or older who have completed at least 12 years of education
POP_SQ_MI	persons per square mile
BLACK	percent of the population reporting primary race as black
NEUR	percent of the population reporting Northern European (English, Scotch, Scotch-Irish, Welsh, Swedish, Norwegian, Dutch, Danish, or German) as primary ancestry
HISP	percent of the population reporting Hispanic (Mexican, Puerto Rican, or Cuban) as primary ancestry
AMINESAL	percent of the population reporting primary race as American Indian, Eskimo, or Aleut
ASIAN	percent of the population reporting Asian (Chinese, Filipino, Japanese, Asian Indian, Korean, or Vietnamese) as primary race
IRISH	percent of the population reporting Irish as primary ancestry
BLACK:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting primary race as black
NEUR:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting Northern European (English, Scotch, Scotch-Irish, Welsh, Swedish, Norwegian, Dutch, Danish, or German) as primary ancestry
HISP:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting Hispanic (Mexican, Puerto Rican, or Cuban) as primary ancestry
AMINESAL:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting primary race as American Indian, Eskimo, or Aleut
ASIAN:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting Asian (Chinese, Filipino, Japanese, Asian Indian, Korean, or Vietnamese) as primary race
IRISH:WH	absolute value of the percent of the population reporting primary race as white minus percent of the population reporting Irish as primary ancestry
POLL_PM10	average micrograms per square meter of particulate matter that is less than 10 micrometers in diameter over a 24 hour period.
INTPTLAT	latitude of the geographical center of the county
INTPTLNG	longitude of the geographical center of the county
INSOL	average annual solar insolation, measured in kilowatt hours per square meter per day
AMENITY	scale constructed by combing six measures (warm winter, winter sun, temperate summer, low summer humidity, topographic variation, and water area)
TEMPJAN	average temperature in January
TEMPJUL	average temperature in July
TEMPANN	average annual temperature
PRECIPJAN	average precipitation in January

Table 2 continued. Variable names and descriptions.

PRECIPJUL	average precipitation in July
PRECIPANN	average annual precipitation
HUMIDJAN	average humidity in January
HUMIDJUL	average humidity in July
ELEVATION	elevation of the county seat
PHYSICIANS_100K	physicians per 100,000 people
AGE	average age of the population

Notes: (d) dummy variable

on mortality Gini coefficients were also drawn from these studies. Because we know that women's life expectancy is inversely related to household size, but that the effect is not the same on every woman, it is expected that the coefficient for HHSIZE will be positive for women. It is also expected that the MARRIED variable coefficient will be negative, based on the positive effect marriage has on life expectancy, especially for men, and that children growing up in a two-parent home also have longer life expectancies. The higher the percentage of families living in a two-parent household, the smaller the mortality Gini coefficient will become. The coefficient of the POVERTY variable is expected to be positive. As more families are living in poverty, which would lessen the life expectancy, the greater the mortality Gini coefficient would be. URBAN and RURAL_FARM are both expected to have positive coefficients, indicating that the greater the inequality in the percent of the population that live in large urban areas, or on small secluded farms, the greater the distribution of life expectancy. These variables are not expected to affect men and women the same, based on the findings of previous studies. CRIME_INDEX and VIOLCRIME are both expected to increase the mortality Gini coefficient. If more people are dying younger due to crime, inequality in the mortality distribution will become larger.

The race and ethnicity variables have been studied in other works. Findings have indicated that the Irish have shorter life expectancies, as do blacks, American Indians, Eskimos and Aleuts, *ceteris paribus*. Because the life expectancies are so different for these races and

whites, and the majority of most counties' populations are white, it would seem that there would be a positive correlation between these variables and the mortality Gini coefficient. It is expected that this correlation will be more evident in the percent-whites-minus-the-percent-of-the-other-race-variables.

There are few expectations for the environmental factors included in this study. Based on the Israelsen, Israelsen and Israelsen life expectancy studies, the pollution variable, POLL_PM10, is expected to affect women more than it does men. The sign of the coefficient for female mortality inequality is expected to be positive, for the same reasoning used with the MARRIAGE variable. Women are apparently affected by pollution, particularly small particle pollution, and the effect would be different for each woman. Therefore, the sign is expected to be positive. There are no prior expectations as to the signs of the other variables in this study.

IV. METHODS

Using these data, the distributions of mortality for men and women in each county by year were calculated. Once these distributions were calculated, mortality Gini coefficients were determined and used in regression analysis. A multiple regression model was created and tested to ascertain the determinants of relative inequality in the distribution of mortality in Mountain States counties. This model is represented below. All variables are linear. For a description of variables see Table 2.

MODEL 1

$$\text{GINI\_M or GINI\_F} = \beta_0 + \beta_1 AZ + \beta_2 ID + \beta_3 MT + \beta_4 NV + \beta_5 NM + \beta_6 UT + \beta_7 WY +$$

$$\beta_8 MARRIED + \beta_9 HHSIZE + \beta_{10} MORTGAGE + \beta_{11} REAL\_PCINC + \beta_{12} POVERTY +$$

β_{13}URBAN + β_{14}RURAL_FARM + β_{15} FOREIGN_BORN + β_{16}LANGUAGE + β_{17}UNEMPLOYMENT + β_{18}CRIME_INDEX + β_{19}VIOLCRIME + β_{20}EDUC + β_{21}POP_SQ_MI + β_{22}BLACK + β_{23}NEUR + β_{24}HISP + β_{25}AMINESAL + β_{26}ASIAN + β_{27}IRISH + β_{28}POLL_PM10 + β_{29}INTPTLAT + β_{30}INTPTLNG + β_{31}INSOL + β_{32}AMENITY + β_{33}TEMPJAN + β_{34}TEMPJUL + β_{35}TEMPANN + β_{36}PRECIPJAN + β_{37}PRECIPJUL + β_{38}PRECIPANN + β_{39}HUMIDJAN + β_{40}HUMIDJUL + β_{41}ELEVATION + β_{42}PHYSICIANS_100K + β_{43}AGE

This model was tested for both dependent variables. To capture the large observed differences in life expectancy between whites and other ethnicities, a second model was constructed by replacing ethnicity variables with the absolute values of the percent of the population white minus the percent of the population of that ethnicity. This model is represented below. All variables are linear. For a description of variables see Table 2.

MODEL 2

GINI_M or GINI_F = β_0 + β_1AZ+ β_2ID + β_3MT + β_4NV + β_5NM + β_6UT + β_7WY + β_8MARRIED + β_9HHSIZE + β_{10}MORTGAGE + β_{11}REAL_PCINC + β_{12} POVERTY + β_{13}URBAN + β_{14}RURAL_FARM + β_{15} FOREIGN_BORN + β_{16}LANGUAGE + β_{17}UNEMPLOYMENT + β_{18}CRIME_INDEX + β_{19}VIOLCRIME + β_{20}EDUC + β_{21}POP_SQ_MI + β_{22}BLACK:WH + β_{23}NEUR:WH + β_{24}HISP:WH + β_{25}AMINESAL:WH + β_{26}ASIAN:WH + β_{27}IRISH:WH + β_{28}POLL_PM10 + β_{29}INTPTLAT + β_{30}INTPTLNG + β_{31}INSOL + β_{32}AMENITY + β_{33}TEMPJAN + β_{34}TEMPJUL + β_{35}TEMPANN + β_{36}PRECIPJAN +

β_{37}PRECIPJUL + β_{38}PRECIPANN + β_{39}HUMIDJAN + β_{40}HUMIDJUL + β_{41}ELEVATION + β_{42}PHYSICIANS_100K + β_{43}AGE

This model was also tested for both dependent variables and compared with Model 1. Third and fourth models were also constructed by running the regression, having omitted state dummy variables, and then excluding variables with at least a 50% chance of committing a Type 1 error. State dummy variables were omitted to determine if they were picking up significance from other variables. This was done for both dependent variables, and for both representations of ethnicity. Because males and females are affected differently, some independent variables are different in each of the restricted models. Each of these models is listed below.

MODEL 3 MALE

GINI_M = β_0 + β_1MARRIED + β_2HHSIZE + β_3MORTGAGE + β_4REAL_PCINC + β_5POVERTY + β_6URBAN + β_7RURAL_FARM + β_8 FOREIGN_BORN + β_9LANGUAGE + β_{10}UNEMPLOYMENT + β_{11}CRIME_INDEX + β_{12}VIOLCRIME + β_{13}EDUC + β_{14}POP_SQ_MI + β_{15}BLACK + β_{16}NEUR + β_{17}HISP + β_{18}AMINESAL + β_{19}ASIAN + β_{20}IRISH + + β_{21}INTPTLAT + β_{22}INTPTLNG + β_{23}INSOL + β_{24}AMENITY + β_{25}PRECIPJUL + β_{26}HUMIDJUL + β_{27}PHYSICIANS_100K

MODEL 3 FEMALE

GINI_F = β_0 + β_1MARRIED + β_2HHSIZE + β_3MORTGAGE + β_4REAL_PCINC + β_5 POVERTY + β_6URBAN + β_7RURAL_FARM + β_8FOREIGN_BORN + β_9LANGUAGE + β_{10}UNEMPLOYMENT + β_{11}CRIME_INDEX + β_{12}VIOLCRIME + β_{13}EDUC + β_{14}POP_SQ_MI

$+ \beta_{15}$BLACK + β_{16}NEUR + β_{17}HISP + β_{18}AMINESAL + β_{19}ASIAN + β_{20}IRISH + β_{21}INTPTLAT + β_{22}INTPTLNG + β_{23}INSOL + β_{24}AMENITY + β_{25}TEMPJUL + β_{26}PRECIPJUL + β_{27}HUMIDJUL

MODEL 4 MALE

GINI_M = β_0 + β_1MARRIED + β_2HHSIZE + β_3MORTGAGE + β_4REAL_PCINC + β_5POVERTY + β_6URBAN + β_7RURAL_FARM + β_8 FOREIGN_BORN + β_9LANGUAGE + β_{10}UNEMPLOYMENT + β_{11}CRIME_INDEX + β_{12}VIOLCRIME + β_{13}EDUC + β_{14}POP_SQ_MI + β_{15}BLACK:WH + β_{16}NEUR:WH + β_{17}HISP:WH + β_{18}AMINESAL:WH + β_{19}ASIAN:WH + β_{20}IRISH:WH + β_{21}INTPTLAT + β_{22}INTPTLNG + β_{23}INSOL + β_{24}TEMPJAN + β_{25}PRECIPJUL + β_{26}PRECIPANN + β_{27}HUMIDJUL + β_{28}PHYSICIANS_100K

MODEL 4 FEMALE

GINI_F = β_0 + β_8MARRIED + β_9HHSIZE + β_{10}MORTGAGE + β_{11}REAL_PCINC + β_{12} POVERTY + β_{13}URBAN + β_{14}RURAL_FARM + β_{15} FOREIGN_BORN + β_{16}LANGUAGE + β_{17}UNEMPLOYMENT + β_{18}CRIME_INDEX + β_{19}VIOLCRIME + β_{20}EDUC + β_{21}POP_SQ_MI + β_{22}BLACK:WH + β_{23}NEUR:WH + β_{24}HISP:WH + β_{25}AMINESAL:WH + β_{26}ASIAN:WH + β_{27}IRISH:WH + β_{29}INTPTLAT + β_{30}INTPTLNG + β_{31}INSOL + β_{40}HUMIDJUL + β_{42}PHYSICIANS_100K

V. REGRESSION RESULTS

Regression results for each of the four models, for both males and females, are given in Tables 3-10. Each model was tested for problems with multicollinearity. Asterisks next to the

variable name denote statistical significance. Three asterisks indicate significance at .01, two asterisks denote significance at .05, and one asterisk indicates significance at .10.

Table 11 will summarize the signs of the coefficients and significance of the variables for all eight models. This table gives a good overall view of the variables that are consistently the same sign and those that are consistently statistically significant.

One notable finding is the difference in R^2 values for the models using the straight percentages of race, versus those that used the absolute value of the percent differences in whites and the other race. We had expected that the percent differences would give better models. This was not a completely accurate assumption. Model 1 Males used the straight percentages, and gave an R^2 value of .4289. Model 2 Males used the percent differences, and gave an R^2 value of .4293. The difference in R^2 is very small, only .0004. Similarly, in the restricted models for males, R^2 was .4158 for both. This would indicate that the Gini coefficient is not better modeled by using the percent differences for males. Conversely, Model 1 Females gave an R^2 of .4418, while Model 2 Females gave an R^2 of .4241. This is a much bigger difference in R^2, and noticeably, it goes the other way. The model that used the percent differences yielded a lower R^2 value than that of the model using straight percentages. Model 3 Females, the restricted model using the straight percentage values for race, gives an R^2 value of .4329. The comparable model using the percent differences gives an R^2 of .4009, an even more drastic difference. It is important to note, however, that the restricted models do not include all the same variables. Some of the variation in R^2 in Model 3 Females and Model 4 Females could be due to that fact.

The only state dummy variable that was statistically significant was UT for men. It was positively correlated, indicating that, other things held equal, the Gini coefficient for (or the

relative inequality of) the distribution of mortality for counties in Utah is greater than would have been expected. None of the other state dummy variables were significant.

Another interesting result was that MORTGAGE was positive and very statistically significant for both men and women in every model. MORTGAGE was used as a cost of living indicator. As the cost of living rises in an area, relative inequality in the distribution of mortality gets larger. This could be due to the fact that there tends to be a greater disparity in the type of housing and amenities available to lower income families. Living in poor health conditions can cause a greater percent of the lower income population to die before expected. This would increase inequality in the mortality distribution.

URBAN did have the expected positive sign, but only for women. This variable was statistically significant for women in three of the four models. However, URBAN had a consistently negative correlation in the male models. This was unexpected. Similarly, RURAL_FARM had the expected positive sign, but for males. Females had a negative and, in three of the four models, statistically significant correlation. This was also unexpected. In the case of RURAL_FARM, it could be that for women, the lifestyle associated with living in a rural farming community may make a healthier population of females in general, leveling the playing field of mortality. The lifestyle of men in a rural farming community includes hard labor and being exposed to the elements in a more extreme way. This takes its toll, but work does not wear down all men in the same predictable way. This would account for the positive coefficient seen in RURAL_FARM in the male models.

Although the VIOLCRIME was almost straight positive across the board, for both men and women, as expected, CRIME_INDEX apparently affects men and women in different ways. The CRIME_INDEX had a consistently positive effect on male mortality inequality, as

Table 3. Model 1 (Male).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	43	0.24701	0.00574	4.09	<.0001
Error	234	0.32888	0.00141		
Corrected Total	277	0.57588			

Root MSE	0.03749	R-Sqare	0.4289
Dependent Mean	0.14395	Adj R-Sq	0.3240
Coeff Var	26.04408		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.84820	0.52805	1.61	0.1096
AZ	0.00822	0.02385	0.34	0.7306
ID	0.03289	0.02093	1.57	0.1175
MT	0.02224	0.02108	1.06	0.2924
NV	0.00901	0.02634	0.34	0.7326
NM	-0.00191	0.01638	-0.12	0.9071
*UT	0.03310	0.01907	1.74	0.0839
WY	0.02190	0.01559	1.40	0.1615
MARRIED	-0.15361	0.13383	-1.15	0.2522
HHSIZE	0.01794	0.02269	0.79	0.4299
***MORTGAGE	0.00009708	0.00003481	2.79	0.0057
REAL_PCINC	-9.39683E-08	0.00000112	-0.08	0.9335
**POVERTY	-0.17715	0.08820	-2.01	0.0457
URBAN	-0.00612	0.01333	-0.46	0.6466
RURAL_FARM	0.08556	0.05508	1.55	0.1217
FOREIGN_BORN	-0.01292	0.14908	-0.09	0.9310
LANGUAGE	0.01485	0.05490	0.27	0.7870
UNEMPLOYMENT	0.00048023	0.00125	0.38	0.7012
CRIME_INDEX	0.11780	0.18010	0.65	0.5137
VIOLCRIME	0.48055	1.52020	0.32	0.7522
EDUC	0.13815	0.11817	1.17	0.2436
POP_SQ_MI	-0.00001547	0.00001672	-0.93	0.3557
BLACK	0.15781	0.27331	0.58	0.5642
NEUR	-0.06238	0.04348	-1.43	0.1527
HISP	-0.01414	0.07543	-0.19	0.8514
***AMINESAL	0.12963	0.04514	2.87	0.0045
ASIAN	-0.12112	0.64251	-0.19	0.8506
IRISH	0.10910	0.13914	0.78	0.4338
POLL_PM10	0.00004062	0.00023795	0.17	0.8646
**INTPTLAT	-0.01307	0.00602	-2.17	0.0310
INTPTLNG	-0.00211	0.00256	-0.83	0.4101
INSOL	-0.06078	0.04195	-1.45	0.1487
AMENITY	-0.00072479	0.00258	-0.28	0.7790
TEMPJAN	-0.00270	0.00271	-1.00	0.3200
TEMPJUL	-0.00225	0.00397	-0.57	0.5705
TEMPANN	0.00179	0.00699	0.26	0.7977
PRECIPJAN	-0.00079476	0.00109	-0.73	0.4674
*PRECIPJUL	-0.00144	0.00081467	-1.76	0.0789
PRECIPANN	0.00018214	0.00017817	1.02	0.3077
HUMIDJAN	-0.00039826	0.00054951	-0.72	0.4693
***HUMIDJUL	0.00225	0.00083907	2.68	0.0078
ELEVATION	-0.00000287	0.00000611	-0.47	0.6394
PHYSICIANS_100K	0.00005051	0.00005535	0.91	0.3624
AGE	-0.00160	0.00162	-0.98	0.3262

Table 4. Model 1 (Female).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	43	0.16280	0.00379	4.23	<.0001
Error	230	0.20573	0.0008945		
Corrected Total	273	0.36854			

Root MSE	0.02991	R-Sqare	0.4418
Dependent Mean	0.11593	Adj R-Sq	0.3374
Coeff Var	25.79803		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.80227	0.42425	1.89	0.0599
AZ	0.00029053	0.01933	0.02	0.9880
ID	0.00764	0.01688	0.45	0.6513
MT	-0.00107	0.01696	-0.06	0.9498
NV	-0.01368	0.02110	-0.65	0.5173
NM	0.00167	0.01326	0.13	0.8996
UT	0.00238	0.01580	0.15	0.8804
WY	0.00814	0.01248	0.65	0.5149
MARRIED	-0.07951	0.11078	-0.72	0.4737
HHSIZE	-0.00443	0.01895	-0.23	0.8152
***MORTGAGE	0.00010980	0.00002828	3.88	0.0001
REAL_PCINC	4.563451E-09	9.109521E-07	0.01	0.9960
POVERTY	0.01399	0.07227	0.19	0.8467
**URBAN	0.02700	0.01069	2.53	0.0122
RURAL_FARM	-0.06204	0.04447	-1.39	0.1644
FOREIGN_BORN	0.11527	0.12155	0.95	0.3440
LANGUAGE	0.01749	0.04400	0.40	0.6913
UNEMPLOYMENT	-0.00148	0.00101	-1.46	0.1470
**CRIME_INDEX	-0.31389	0.14420	-2.18	0.0305
VIOLCRIME	0.70756	1.21395	0.58	0.5606
EDUC	0.06484	0.09498	0.68	0.4955
POP_SQ_MI	-0.00000807	0.00001342	-0.60	0.5480
BLACK	0.17061	0.21846	0.78	0.4356
NEUR	-0.03001	0.03504	-0.86	0.3926
HISP	-0.03917	0.06114	-0.64	0.5224
***AMINESAL	-0.11930	0.03637	3.28	0.0012
ASIAN	-0.42034	0.51504	-0.82	0.4153
IRISH	-0.07932	0.11271	-0.70	0.4823
POLL_PM10	0.00007741	0.00018992	0.41	0.6840
INTPTLAT	-0.00541	0.00491	-1.10	0.2718
INTPTLNG	0.00109	0.00207	0.53	0.5979
INSOL	-0.02929	0.03363	-0.87	0.3846
AMENITY	-0.00089342	0.00209	-0.43	0.6688
TEMPJAN	-0.00062659	0.00218	-0.29	0.7743
TEMPJUL	-0.00224	0.00318	-0.71	0.4808
TEMPANN	0.00058699	0.00561	0.10	0.9167
PRECIPJAN	0.00001053	0.00087837	0.01	0.9904
PRECIPJUL	-0.00038245	0.00065502	-0.58	0.5599
PRECIPANN	0.00002246	0.00014349	0.16	0.8758
HUMIDJAN	0.00001725	0.00043909	0.04	0.9687
HUMIDJUL	-0.00056507	0.00070047	-0.81	0.4207
ELEVATION	-0.00000771	0.00000490	-1.57	0.1171
PHYSICIANS_100K	-0.00005699	0.00004543	-1.25	0.2109
AGE	-0.00032247	0.00134	-0.24	0.8103

Table 5. Model 2 (Male).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	43	0.24722	0.00575	4.09	<.0001
Error	234	0.32867	0.0014		
Corrected Total	277	0.57588			

Root MSE	0.03748	R-Sqare	0.4293
Dependent Mean	0.14395	Adj R-Sq	0.3244
Coeff Var	26.03577		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1.02064	0.53267	1.92	0.0566
AZ	0.00792	0.02362	0.34	0.7377
ID	0.02933	0.02078	1.41	0.1595
MT	0.02275	0.02107	1.08	0.2815
NV	0.00670	0.02639	0.25	0.7997
NM	-0.00043049	0.01627	-0.03	0.9789
*UT	0.03221	0.01901	1.69	0.0915
WY	0.02242	0.01559	1.44	0.1519
MARRIED	-0.15855	0.13338	-1.19	0.2358
HHSIZE	0.02887	0.02066	1.40	0.1635
***MORTGAGE	0.00009551	0.00003474	2.75	0.0064
REAL_PCINC	1.429852E-07	0.00000111	0.13	0.8973
*POVERTY	-0.15298	0.08588	-1.78	0.0761
URBAN	-0.00846	0.01306	-0.65	0.5177
RURAL_FARM	0.07780	0.05452	1.43	0.1549
FOREIGN_BORN	-0.02481	0.14126	-0.18	0.8608
LANGUAGE	-0.01416	0.05714	-0.25	0.8045
UNEMPLOYMENT	0.00032626	0.00125	0.26	0.7949
CRIME_INDEX	0.13540	0.18009	0.75	0.4529
VIOLCRIME	0.03752	1.52738	0.02	0.9804
EDUC	0.12846	0.11770	1.09	0.2762
POP_SQ_MI	-0.00001847	0.00001637	-1.13	0.2604
BLACK:WH	-0.05776	0.27710	-0.21	0.8351
NEUR:WH	0.04915	0.04477	1.10	0.2734
HISP:WH	0.02968	0.06762	0.44	0.6611
AMINESAL:WH	-0.01166	0.03696	-0.32	0.7527
ASIAN:WH	-0.00226	0.33462	-0.01	0.9946
IRISH:WH	-0.14279	0.13250	-1.08	0.2823
POLL_PM10	0.00004363	0.00023796	0.18	0.8547
**INTPTLAT	-0.01465	0.00605	-2.42	0.0163
INTPTLNG	-0.00247	0.00256	-0.96	0.3363
*INSOL	-0.07433	0.04183	-1.78	0.0769
AMENITY	-0.00082805	0.00258	-0.32	0.7482
TEMPJAN	-0.00227	0.00270	-0.84	0.4022
TEMPJUL	-0.00142	0.00393	-0.36	0.7174
TEMPANN	0.00021858	0.00694	0.03	0.9749
PRECIPJAN	-0.00059903	0.00109	-0.55	0.5824
*PRECIPJUL	-0.00141	0.00081187	-1.74	0.0829
PRECIPANN	0.00016565	0.00017708	0.94	0.3505
HUMIDJAN	-0.00054	0.00054972	-0.98	0.3286
***HUMIDJUL	0.00224	0.00082916	2.70	0.0075
ELEVATION	-0.00000330	0.00000611	-0.54	0.5893
PHYSICIANS_100K	0.00005347	0.00005535	0.97	0.3350
AGE	-0.00085187	0.00155	-0.55	0.5843

Table 6. Model 2 (Female).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	43	0.15630	0.00363	3.94	<.0001
Error	230	0.21224	0.00092276		
Corrected Total	273	0.36854			

Root MSE	0.03038	R-Sqare	0.4241
Dependent Mean	0.11593	Adj R-Sq	0.3164
Coeff Var	26.20244		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.86083	0.43501	1.98	0.0490
AZ	0.00681	0.01945	0.35	0.7266
ID	0.00140	0.01699	0.08	0.9342
MT	-0.00368	0.01722	-0.21	0.8309
NV	-0.01477	0.02148	-0.69	0.4925
NM	0.00596	0.01337	0.45	0.6563
UT	-0.00166	0.01598	-0.10	0.9175
WY	0.00628	0.01267	0.50	0.6209
MARRIED	-0.10086	0.11195	-0.90	0.3686
HHSIZE	0.01674	0.01741	0.96	0.3375
***MORTGAGE	0.00010437	0.00002868	3.64	0.0003
REAL_PCINC	4.48174E-07	9.084165E-07	0.49	0.6222
POVERTY	0.05699	0.07162	0.80	0.4271
**URBAN	0.02235	0.01066	2.10	0.0372
*RURAL_FARM	-0.07806	0.04481	-1.74	0.0828
FOREIGN_BORN	0.06790	0.11647	0.58	0.5605
LANGUAGE	-0.01043	0.04666	-0.22	0.8234
UNEMPLOYMENT	-0.00143	0.00103	-1.39	0.1672
**CRIME_INDEX	-0.30619	0.14651	-2.09	0.0377
VIOLCRIME	0.37110	1.23939	0.30	0.7649
EDUC	0.05000	0.09613	0.52	0.6035
POP_SQ_MI	-0.00001340	0.00001336	-1.00	0.3167
BLACK:WH	-0.13113	0.22503	-0.58	0.5606
NEUR:WH	0.03118	0.03668	0.85	0.3962
HISP:WH	0.04912	0.05563	0.88	0.3782
AMINESAL:WH	-0.00242	0.03000	-0.08	0.9358
ASIAN:WH	-0.05714	0.27315	-0.21	0.8345
IRISH:WH	0.02263	0.10882	0.21	0.8355
POLL_PM10	0.00007695	0.00019295	0.40	0.6904
INTPTLAT	-0.00582	0.00502	-1.16	0.2479
INTPTLNG	0.00102	0.00211	0.48	0.6286
INSOL	-0.03940	0.03410	-1.16	0.2492
AMENITY	-0.00105	0.00211	-0.50	0.6198
TEMPJAN	-0.00009398	0.00221	-0.04	0.9662
TEMPJUL	-0.00107	0.00320	-0.33	0.7384
TEMPANN	-0.00133	0.00566	-0.23	0.8150
PRECIPJAN	0.00012939	0.00088886	0.15	0.8844
PRECIPJUL	-0.00027376	0.00066286	-0.41	0.6800
PRECIPANN	0.00000777	0.00014497	0.05	0.9573
HUMIDJAN	-0.00006606	0.00044605	-0.15	0.8824
HUMIDJUL	-0.00082116	0.00070013	-1.17	0.2124
ELEVATION	-0.00000765	0.00000498	-1.54	0.1258
PHYSICIANS_100K	-0.00004999	0.00004613	-1.08	0.2797
AGE	0.00071	0.00130	0.55	0.5842

Table 7. Model 3 (Male).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	30	0.23948	0.00798	5.86	<.0001
Error	247	0.33640	0.00136		
Corrected Total	277	0.57588			

Root MSE	0.03690	R-Sqare	0.4158
Dependent Mean	0.14395	Adj R-Sq	0.3449
Coeff Var	25.63792		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.43960	0.28834	1.52	0.1286
MARRIED	-0.14936	0.12632	-1.18	0.2382
HHSIZE	0.03230	0.02073	1.56	0.1205
**MORTGAGE	0.00007316	0.00003086	2.37	0.0185
REAL_PCINC	1.366856E-07	0.00000101	0.14	0.8924
**POVERTY	-0.17438	0.08171	-2.13	0.0338
URBAN	-0.00679	0.01219	-0.56	0.5781
RURAL_FARM	0.08109	0.05098	1.59	0.1129
FOREIGN_BORN	-0.00238	0.14201	-0.02	0.9866
LANGUAGE	0.01587	0.04806	0.33	0.7415
UNEMPLOYMENT	0.00071199	0.00119	0.60	0.5504
CRIME_INDEX	0.16056	0.16240	0.99	0.3238
VIOLCRIME	0.36676	1.40856	0.26	0.7948
EDUC	0.08060	0.10515	0.77	0.4441
POP_SQ_MI	-0.00001781	0.00001550	-1.15	0.2519
BLACK	0.19674	0.25537	0.77	0.4418
NEUR	-0.04048	0.03955	-1.02	0.3070
HISP	-0.01535	0.06943	-0.22	0.8252
***AMINESAL	0.11365	0.04032	2.82	0.0052
ASIAN	-0.24269	0.60611	-0.40	0.6892
IRISH	0.11256	0.12856	0.88	0.3821
***INTPTLAT	-0.00909	0.00386	-2.35	0.0194
INTPTLNG	-0.00232	0.00141	-1.65	0.1008
INSOL	-0.04562	0.32290	-1.41	0.1590
AMENITY	0.00003612	0.00165	0.02	0.9826
***TEMPJAN	-0.00180	0.00056962	-3.16	0.0018
*PRECIPJUL	-0.00114	0.00061952	-1.83	0.0677
PRECIPANN	0.00008415	0.00007302	1.15	0.2503
***HUMIDJUL	0.00213	0.00073617	2.89	0.0042
PHYSICIANS_100K	0.00005651	0.00005208	1.09	0.2790
AGE	-0.00133	0.00154	-0.86	0.3896

Table 8. Model 3 (Female).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	29	0.15954	0.00550	6.42	<.0001
Error	244	0.20899	0.00085653		
Corrected Total	273	0.36854			

Root MSE	0.02927	R-Sqare	0.4329
Dependent Mean	0.11593	Adj R-Sq	0.3655
Coeff Var	25.24462		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1.05095	0.27866	3.77	0.0002
MARRIED	-0.05548	0.08818	-0.63	0.5299
HHSIZE	0.00393	0.01208	0.33	0.7449
***MORTGAGE	0.00009427	0.00002457	3.84	0.0002
REAL_PCINC	3.866914E-07	7.874071E-07	0.49	0.6238
POVERTY	0.00167	0.06466	0.03	0.9794
***URBAN	0.02874	0.00998	2.88	0.0044
*RURAL_FARM	-0.06900	0.04089	-1.69	0.0928
FOREIGN_BORN	0.10057	0.11410	0.88	0.3789
LANGUAGE	0.01942	0.03831	0.51	0.6126
UNEMPLOYMENT	-0.00113	0.00095147	-1.19	0.2345
**CRIME_INDEX	-0.27114	0.13050	-2.08	0.0388
VIOLCRIME	0.86759	1.10508	0.79	0.4332
EDUC	0.01233	0.08127	0.15	0.8795
POP_SQ_MI	0.00000894	0.00001229	-0.73	0.4677
BLACK	0.15430	0.19783	0.78	0.4362
NEUR	-0.03328	0.03109	-1.07	0.2855
HISP	-0.05212	0.05571	-0.94	0.3504
***AMINESAL	0.10936	0.03230	3.39	0.0008
ASIAN	-0.45218	0.47811	-0.95	0.3452
IRISH	-0.11024	0.10390	-1.06	0.2897
**INTPTLAT	-0.00747	0.00309	-2.42	0.0164
INTPTLNG	0.00151	0.00107	1.42	0.1581
**INSOL	-0.05101	0.02427	-2.10	0.0366
AMENITY	-0.00151	0.00149	-1.01	0.3130
**TEMPJUL	-0.00253	0.00101	-2.51	0.0126
PRECIPJUL	-0.00047554	0.00042447	-1.12	0.2637
HUMIDJUL	-0.00068018	0.00059007	-1.15	0.2502
***ELEVATION	-0.00000860	0.00000330	-2.60	0.0098
PHYSICIANS_100K	-0.00004713	0.00004220	-1.12	0.2652

Table 9. Model 4 (Male).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	28	0.23948	0.00855	6.33	<.0001
Error	249	0.33640	0.00135		
Corrected Total	277	0.57588			

Root MSE	0.03676	R-Sqare	0.4158
Dependent Mean	0.14395	Adj R-Sq	0.3502
Coeff Var	25.53472		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.55328	0.29276	1.89	0.0599
*MARRIED	-0.18833	0.10750	-1.75	0.0810
***HHSIZE	0.04701	0.01423	3.30	0.0011
**MORTGAGE	0.00007457	0.00002944	2.53	0.0119
REAL_PCINC	4.192771E-07	9.648225E-07	0.43	0.6643
**POVERTY	-0.15752	0.07813	-2.02	0.0449
URBAN	-0.00863	0.01185	-0.73	0.4674
RURAL_FARM	-0.07220	0.04980	1.45	0.1483
FOREIGN_BORN	-0.01435	0.13220	-0.11	0.9137
LANGUAGE	-0.01157	0.04948	-0.23	0.8153
UNEMPLOYMENT	0.00053829	0.00119	0.45	0.6505
CRIME_INDEX	0.17437	0.16084	1.08	0.2794
VIOLCRIME	-0.03755	1.40316	-0.03	0.9787
EDUC	0.07518	0.10092	0.74	0.4570
POP_SQ_MI	-0.00002138	0.00001505	-1.42	0.1566
BLACK:WH	-0.12306	0.25660	-0.48	0.6320
NEUR:WH	0.02668	0.04071	0.66	0.5129
HISP:WH	0.02298	0.06316	0.36	0.7163
AMINESAL:WH	-0.12820	0.03489	-0.37	0.7136
ASIAN:WH	0.12142	0.30236	0.40	0.6883
IRISH:WH	-0.15729	0.12039	-1.31	0.1926
***INTPTLAT	-0.01019	0.00375	-2.72	0.0071
*INTPTLNG	-0.00244	0.00135	-1.81	0.0718
*INSOL	-0.05445	0.03188	-1.71	0.0889
***TEMPJAN	-0.00193	0.00053230	-3.63	0.0003
*PRECIPJUL	-0.00118	0.00061769	-1.91	0.0579
PRECIPANN	0.00008572	0.00007202	1.19	0.2351
***HUMIDJUL	0.00213	0.00072285	2.95	0.0035
PHYSICIANS_100K	0.00005683	0.00005103	1.11	0.2665

Table 10. Model 4 (Female).

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	28	0.14773	0.00528	5.85	<.0001
Error	245	0.22081	0.00090126		
Corrected Total	273	0.36854			

Root MSE	0.03002	R-Sqare	0.4009
Dependent Mean	0.11593	Adj R-Sq	0.3324
Coeff Var	25.8954		

	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	0.67682	0.24187	2.80	0.0055
MARRIED	-0.07451	0.10608	-0.70	0.4831
HHSIZE	0.02491	0.01555	1.60	0.1104
***MORTGAGE	0.00008997	0.00002519	3.57	0.0004
REAL_PCINC	7.75051E-07	8.072065E-07	0.96	0.3379
POVERTY	0.04434	0.06503	0.68	0.4960
*URBAN	0.01623	0.00940	1.73	0.0856
**RURAL_FARM	-0.08487	0.04172	-2.03	0.0430
FOREIGN_BORN	0.05866	0.10822	0.54	0.5883
LANGUAGE	-0.00503	0.04156	-0.12	0.9038
UNEMPLOYMENT	-0.00088706	0.00096366	-0.92	0.3582
*CRIME_INDEX	-0.24285	0.13356	-1.82	0.0702
VIOLCRIME	0.53749	1.14050	0.47	0.6379
EDUC	-0.00686	0.08487	-0.08	0.9356
POP_SQ_MI	-0.00001820	0.00001233	-1.48	0.1411
BLACK:WH	-0.09523	0.20957	-0.45	0.6499
NEUR:WH	0.04107	0.03266	1.26	0.2098
HISP:WH	0.05339	0.05235	1.02	0.3088
AMINESAL:WH	0.00284	0.02840	0.10	0.9204
ASIAN:WH	-0.09572	0.24603	-0.39	0.6976
IRISH:WH	0.01503	0.10031	-0.15	0.8810
INTPTLAT	-0.00456	0.00300	-1.52	0.1297
INTPTLNG	0.00103	0.00102	1.01	0.3151
**INSOL	-0.05604	0.02501	-2.24	0.0259
AMENITY	-0.00084605	0.00148	-0.57	0.5691
HUMIDJUL	-0.00084629	0.00053953	-1.57	0.1180
ELEVATION	-0.00000116	0.00000178	-0.65	0.5163
PHYSICIANS_100K	-0.00002602	0.00043260	-0.60	0.5482
AGE	0.00086967	0.00124	0.70	0.4826

Table 11. Comparison of all models, based on sign of coefficient and statistical significance.

	Model 1 M		Model 1 F		Model 2 M		Model 2 F		Model 3 M		Model 3 F		Model 4 M		Model 4 F	
Variable	Sign	Sig.	Sign	Sig.	Sign	Sig.	Sign	Sig.	Sign	Sig.	Sign	Sig.	Sign	Sig.	Sign	Sig.
AZ	+		+		+		+									
ID	+		+		+		+									
MT	+		-		+		-									
NV	+		-		+		-									
NM	-		+		-		+									
UT	+	*	+		+	*	-									
WY	+		+		+		+									
Married	-		-		-		-		-		-		-		-	
HHSize	+		-		+		+		+		+		+	***	+	
Mortgage	+	***	+	***	+	***	+	***	+	**	+	***	+	**	+	***
Real_PCINC	-		+		+		+		+		+		+		+	
Poverty	-	**	+		-	*	+		-	**	+		-	**	+	
Urban	-		+		-		+	**	-		+	***	-		+	*
Rural_Farm	+		-		+		-	*	+		-	*	+		-	**
Foreign_Born	-		+		-		+		-		+		-		+	
Language	+		+		-		-		+		+		-		-	
Unemploy	+		-		+		-		+		-		+		-	
Crime_Index	+		-	**	+		-	**	+		-	**	+		-	*
ViolCrime	+		+		+		+		+		+		-		+	
Educ	+		+		+		+		+		+		+		-	
Pop_Sq_Mi	-		-		-		-		-		-		-		-	
Black	+		-						+		+					
Neur	-		-						-		-					
Hisp	-		-						-		-					
AmInEsAl	+	***	+	***					+	***	+	***				
Asian	-		-						-		-					
Irish	+		-						+		-					
Bl:Wh					-		-						-		-	
Neur:Wh					+		+						+		+	
Hisp:Wh					+		+						+		+	
AmInEsAl:Wh					-		-						-		+	
Asian:Wh					-		-						+		-	
Irish:Wh					-		+						-		+	
Poll_Pm10	+		+		+		+									
IntPtLat	-	**	-		-	**	-		-	**	-	**	-	***	-	
IntPtLng	-		+		-		+		-	*	+		-	*	+	
Insol	-		-		-	*	-		-		-	**	-		-	**
Amenity	-		-		-		-		+		-				-	
TempJan	-		-		-		-		-	***			-	***		
TempJul	-		-		-		-				-	**				
TempAnn	+		+		+		-									
PrecipJan	-		+		-		+									
PrecipJul	-	*	-		-	*	-		-	*	-		-	*		
PrecipAnn	+		+		+		+		+				+			
HumidJan	-		+		-		-									
HumidJul	+	***	-		+	***	-		+	***	-		+	***	-	
Elevation	-		-		-		-				-				-	
Physician_100K	+		-		+		-		+		-		+		-	
Age	-		-		-		+		-						+	

expected, but had a consistently significant negative effect on female mortality inequality.

Of all the ethnicity and race variables, the only one that was significant was AMINESAL. It was positively correlated with the Gini coefficient, as was expected. There is a large disparity between the life expectancy of whites and the life expectancy of American Indians, Eskimos, and Aleuts. The larger the percentage of the population that is American Indian, Eskimo, or Aleut, the greater is the relative inequality in the distribution of mortality.

There were several environmental variables that had statistically significant coefficients. TEMPJAN, TEMPJUL, and PRECIPJUL were all statistically significant in at least one of the models, and all were negatively correlated with mortality Gini coefficients. TEMPJAN and PRECIPJUL were significant for males, while TEMPJUL was significant for females. HUMIDJUL was consistently significant and positive for males, and consistently negative for females. It is worth noting that this variable was the only environmental variable that seems to affect men and women oppositely. INTPTLAT and INTPTLNG coefficients were both negative and significant for male mortality inequality. INSOL was consistently negative for both men and women, and statistically significant for women in two models, and for men in one. Recent studies have shown that being in the sun each day results in improved health. In places where sun hits the earth in larger amounts, the population of that area might be healthier, decreasing inequality in the distribution of mortality.

VI. CONCLUSION

Several significant determinants of the distribution of mortality were determined. For both men and women, the only statistically significant factors affecting mortality inequality were the average mortgage payment and the percent of the population that were American Indian,

Eskimo, or Aleut. Both of these factors have a positive correlation with inequality in the distribution of mortality.

Several determinants were also identified that are significant for women only. The percent of the population living in an urban area and the percent living on a rural farm both affected women, although they had different correlation signs. The percent urban was positively correlated with mortality Gini coefficients, while the percent on rural farms was negatively correlated. The crime index, insolation, and the average temperature in July also all have a negative relationship with relative inequality in mortality distribution.

Significant factors that affected only men include a negative relationship of the percent of the population living in poverty, latitude, longitude, average temperature in January, and average precipitation in July with mortality Gini coefficients. There is a positive relationship between inequality in the mortality distribution and average humidity in July.

VII. FURTHER RESEARCH

There are multiple opportunities for further research on the subject of mortality distribution. There has been little work done in this area thus far. The most obvious is the expansion of this study to include all U.S. counties. It would be interesting to see how this study's results would compare with a study of the entire U.S. Getting more recent data to test these models would also be an interesting topic for another paper. As mentioned before, this is an area of research that is important for many people, including policy-makers, and it has been conspicuously under-researched. There are many opportunities for further study in this area.

References

Brainerd, E. and D.M. Cutler. Autopsy on an Empire. Understand Mortality in Russia and the Former Soviet Union. *Journal of Economic Perspectives* 2005, 19, 1 (Winter): 107-130

Ewbank, D.C. History of Black Mortality and Health before 1940. *The Milbank Quarterly* 1987, 65 (Suppl 1): 101-127.

Franzini, Luisa, John Ribble, and William Spears. The Effects of Income Inequality and Income Level on Mortality Vary by Population Size in Texas Counties. *Journal of Health and Social Behavior* 2001, 42 (December):373-378.

Geronimus, A.T., J. Bound, T.A. Waidman, M.M. Hillemeier, and P.B. Burns. Excess Mortality Among Blacks and Whites in the United States. *New England Journal of Medicine* 1996, 335:1552-1558

Gulliot, M. The Momentum of Mortality Change. *Population Studies* 2005, 59, 3 (November): 283-294

Harvard Center for Population and Development Studies. U.S. Patterns of Mortality by County and Race: 1965-1994. *Working Paper Series* 1998.

Hurt, L.S., C. Ronsmans, S.L. Thomas. The Effect of Number of Births on Women's Mortality: Systematic Review of the Evidence for Women Who Have Completed Their Childbearing. *Population Studies* 2006, 60 (March): 55-71.

Israelsen, Anne J., L. Dwight Israelsen, and Ryan D. Israelsen. The Distribution of Life Expectancy within U.S. States. *Utah State University ERI Study Paper* #2006-02, April 2005b (10 pages).

Israelsen, L. Dwight, Ryan D. Israelsen, and Karl E. Israelsen. Determinants of Life Expectancies in U.S. Counties. *Utah State University ERI Study Paper* #2001-17, June 2001 (62 pages).

_____. Ultimate Inequality: Determinants of Life Expectancies in Mountain States Counties. *The Journal of the Utah Academy of Sciences, Arts, and Letters* 2002, 79: 24-42.

Israelsen, L. Dwight, Ryan D. Israelsen, and William J. Israelsen. The Distribution of Mortality in U.S. Counties: A Preliminary Report. *Presentation at the Western Economics Association Annual Conference*, San Francisco, California. July 7, 2005a. Published as The Distribution of Mortality in U.S. Counties, *Utah State University ERI Study Paper* #2006-03, June 2005a (12 pages).

Manton, K.G., C.H. Patrick, and K.W. Johnson. Health Differentials between Blacks and Whites: Recent Trends in Mortality and Morbidity. *The Milbank Quarterly* 1987, 65 (Suppl 1):129-199.

McGehee, M.A. Black/White Life Expectancy Differences and Sociodemographics: Arkansas and the U.S. *Journal and the Arkansas Medical Society* 1994, 91(4):177-180